ACCESSION #: 9103200157

LICENSEE EVENT REPORT (LER)

FACILITY NAME: PLANT HATCH, UNIT 2 PAGE: 1 OF 6

DOCKET NUMBER: 05000366

TITLE: PERSONNEL ERROR RESULTS IN REACTOR SCRAM ON APRM HIGH FLUX

EVENT DATE: 02/24/91 LER #: 91-005-00 REPORT DATE: 03/15/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 2 POWER LEVEL: 000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION: 50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: STEVEN B. TIPPS, MANAGER NUCLEAR SAFETY AND COMPLIANCE, HATCH TELEPHONE: (912) 367-7851

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: SD COMPONENT: 84 MANUFACTURER: B042
REPORTABLE NPRDS: NO

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 2/24/91 at approximately 2013 CST, Unit 2 was in the Startup mode with the reactor critical at less than 1% rated thermal power. Reactor pressure was approximately 280 psig, and reactor coolant temperature was approximately 416 degrees F. A nuclear heatup to rated pressure and temperature (approximately 1000 psig and 545 degrees F, respectively) was in progress per procedure 34GO-OPS-001-2S, "Plant Startup." At that time, the reactor scrammed on Average Power Range Monitor (APRM, EIIS Code IG) high flux. Neutron flux increased to the scram setpoint of about 12% rated thermal power when feedwater was rapidly injected into the reactor vessel in response to decreasing reactor water level. Water level had begun to decrease when a Bypass Valve (BPV, EIIS Code SO) opened to control reactor pressure. The BPV opened during heatup, because licensed Operations personnel failed to maintain the BPV's pressure control setpoint above reactor pressure as required by procedure 34GO-OPS-001-2S.

The cause of this event was personnel error. Licensed Operations personnel failed to maintain the BPV's pressure control setpoint above reactor pressure as required by procedure, As a result, the BPV opened at its pressure setpoint of approximately 280 psig, allowing reactor vessel water inventory in the form of saturated steam to flow to the Condenser (EIIS Code SQ) and thereby causing reactor water level to decrease. Operations personnel failed to recognize the BPV was open. To control water level with the BPV open, feedwater was injected into the vessel, resulting in a power increase and scram on APRM high flux.

Corrective action for this event consisted of counseling the involved personnel.

END OF ABSTRACT

TEXT PAGE 2 OF 6

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor
Energy Industry Identification System codes are identified in the text as (EIIS Code XX).

SUMMARY OF EVENT

On 2/24/91 at approximately 2013 CST, Unit 2 was in the Startup mode with the reactor critical at less than 1% rated thermal power. Reactor pressure was approximately 280 psig, and reactor coolant temperature was approximately 416 degrees F. A nuclear heatup to rated pressure and temperature (approximately 1000 psig and 545 degrees F, respectively) was in progress per procedure 34GO-OPS-001-2S, "Plant Startup." At that time, the reactor scrammed on Average Power Range Monitor (APRM, EIIS Code IG) high flux. Neutron flux increased to the scram setpoint of about 12% rated thermal power when feedwater was rapidly injected into the reactor vessel in response to decreasing reactor water level. Water level had begun to decrease when a Bypass Valve (BPV, EIIS Code SO) opened to control reactor pressure. The BPV opened during heatup, because licensed Operations personnel failed to maintain the BPV's pressure control setpoint above reactor pressure as required by procedure 34GO-OPS-001-2S.

The cause of this event was personnel error. Licensed Operations personnel failed to maintain the BPV's pressure control setpoint above reactor pressure as required by procedure. As a result, the BPV opened at its pressure setpoint of approximately 280 psig, allowing reactor vessel water inventory in the form of saturated steam to flow to the Condenser (EIIS Code SQ) and thereby causing reactor water level to decrease. Operations personnel failed to recognize the BPV was open. To control water level with the BPV open, feedwater was injected into the vessel, resulting in a power increase and scram on APRM high flux.

Contributing to this event was the closure of valve 2N21-F165 (Feedwater Long-Cycle Return to Condenser). The valve indicated open; however, it had failed closed.

Corrective action for this event consisted of counseling the involved personnel.

DESCRIPTION OF EVENT

On 2/24/91, a Unit 2 startup was in progress per procedure 34GO-OPS-001-2S. The reactor was critical, and a nuclear heatup to rated pressure and temperature was underway. Reactor power was less than 1% rated thermal power. At 2002 CST, reactor pressure had increased to approximately 280 psig, and reactor coolant temperature was 416 degrees F. Reactor water level was in its normal operating band at 35 inches above instrument zero (about 199 inches above the top of the active fuel). Control rods were being withdrawn to continue the heatup to rated pressure and temperature.

At that time, reactor water level began to decrease. Although licensed operators did not realize it, a BPV had opened as reactor pressure increased to the BPV's pressure control setpoint of approximately 280 psig. The open BPV allowed reactor vessel water inventory in the form of saturated steam to flow to the Condenser, causing reactor water level to decrease.

In an attempt to stop the water level decrease, Operations personnel terminated Reactor Water Cleanup (RWCU, EIIS Code CE) system discharge flow to the Condenser. However, water level continued to decrease. (Since water temperature increases during heatup, changes in its density will cause the level to increase. Water is discharged to the Condenser to counteract this increase and maintain a constant level.)

In an attempt to increase CRD system water flow into the reactor vessel and halt the water level decrease, Operations personnel increased flow on the operating Control Rod Drive (CRD, EIIS Code AA) system pump and then started a second CRD system pump. These actions failed to stop the water level decrease. Therefore, Operations personnel decided to inject water into the reactor vessel via the Feedwater (EIIS, Code SJ) system.

The operating crew believed the Condensate (EIIS Code SD) system was operating in the long-cycle recirculation mode in which condensate is filtered through the Condensate Filter/Demineralizers prior to injection into the reactor vessel. Valves 2N21-F110 (Startup Level Control Bypass), 2N21-F125 (Startup Level Control Isolation), and 2N21-F111 (Startup Level Control) were open. Valves 2N21-F006A and B (Feedwater Injection) were closed, and one Condensate Pump and one Condensate Booster Pump were in operation. Valve indication in the Main Control Room showed valve 2N21-F165 (Feedwater Long-Cycle Return to Condenser) was open; however, post-event investigation revealed the valve had failed closed.

As reactor water level decreased to approximately 19 inches above instrument zero, Operations personnel began to close valve 2N21-F110 so Startup Level Control Valve 2N21-F111, which was already open, could automatically control water level per design. At approximately the same time, valve 2N21-F006A was opened, and within 3 minutes reactor water level increased from 19 inches to approximately 83 inches above instrument zero. This happened, in part, because valve 2N21-F110 was not fully closed when valve 2N21-F006A was opened, thereby creating a larger flow area than desired. Also, with valve 2N21-F165 failed closed, no water was diverted to the Condenser, and Condensate Booster Pump discharge pressure was higher than expected since the pump was pumping through its minimum flow line only. Therefore, closure of valve 2N21-F165 caused feedwater to inject into the vessel in quantities greater than expected.

When the relatively cold feedwater was injected into the reactor vessel, power immediately began to increase due to the increase in moderator density. By approximately 2013 CST, the APRMs in the "A" and "B" Reactor Protection System (RPS, EIIS Code JC) channels reached their high flux trip setpoints of approximately 12% rated thermal power. This occurred less than 2 minutes after feedwater injection began and at a reactor water level of about 64 inches above instrument zero. Both channels of the RPS actuated per design, resulting in a full reactor scram.

Following the scram, reactor pressure decreased and the open BPV closed when pressure dropped below the pressure control setpoint. RWCU system discharge flow to the Condenser was started and the second CRD pump was secured to reduce reactor water level from a maximum of 83 inches above instrument zero to its normal level.

CAUSE OF THE EVENT

The cause of this event was personnel error. Licensed Operations personnel failed to maintain the BPV's pressure control setpoint above reactor pressure as required by procedure. As a result, a BPV opened at its pressure setpoint of approximately 280 psig, allowing reactor vessel water inventory in the form of saturated steam to flow to the Condenser and thereby causing reactor water level to decrease. Operations personnel failed to recognize the BPV was open. To control water level with the BPV open, relatively cold feedwater was injected into the vessel, resulting in a power increase and scram on APRM high flux.

Contributing to this event was the closure of valve 2N21-F165. The valve indicated open; however, it had failed closed. With valve 2N21-F165 closed, system flow to the Condenser was through the Condensate Booster Pump mini flow line only. Consequently, Condensate Booster Pump discharge pressure was higher than expected (approximately 600 psig versus the normal 300 psig). Licensed operators failed to recognize the higher than normal system pressure and greater than expected feedwater flow into the reactor vessel.

REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This report is required by 10 CFR 50.73(a)(2)(iv) because an unplanned actuation of the Reactor Protection System (RPS) occurred. Specifically, the RPS actuated on APRM high flux when feedwater was injected rapidly into the reactor vessel to control a decreasing reactor water level. The cold feedwater caused reactor power to increase to the APRM high flux scram setpoint of approximately 12% rated thermal power.

The RPS automatically initiates a reactor scram to ensure the radioactive materials barriers, such as the fuel cladding, are maintained and to mitigate the consequences of transients and accidents. One of the signals which initiates an automatic reactor scram is APRM high flux, 15% in the Startup mode. The setpoint of 15% is the Unit 2 Technical Specifications limit for this RPS trip signal. The actual trip setpoint is approximately 12% which is conservative. This trip ensures Unit 2 Technical Specifications Safety Limit 2.1 is not exceeded. Safety Limit 2.1 states that thermal power shall not exceed 25% rated thermal power when reactor vessel pressure is less than 785 psig or core flow is less than 10% rated flow. Both of these conditions exist during reactor startup; therefore, this trip is armed until the mode switch is moved to the Run position at which point reactor pressure and core flow are above the limits specified in Safety Limit 2.1. The trip setpoint of 15% provides margin between the Safety Limit and the trip to ensure the Safety Limit is not exceeded for anticipated maneuvers, including analyzed transients, associated with power plant startup.

In the event described in this report, feedwater injection added positive reactivity to the core, resulting in a power increase. The APRms responded per design to track the power increase and, because the unit was in the Startup mode, to initiate a reactor scram when reactor power reached approximately 12% rated thermal power. The rapid insertion of control rods terminated the power increase. At no point in the event did reactor power exceed 12% rated thermal power.

Based on the above discussion, it is concluded this event had no adverse impact on nuclear safety. This analysis is applicable only to the Startup mode since the APRM 15% flux trip is needed only in this mode.

CORRECTIVE ACTION

1. Involved personnel were counseled.

2. The positioner on valve 2N21-F165 was replaced on 2/26/91 per

Maintenance Work Order 2-91-782.

ADDITIONAL INFORMATION

1. Other Systems Affected:

No systems other than the systems mentioned in this report were affected by this event.

2. Failed Components Identification:

Master Parts List Number:	2N21-F165 (positioner is part of valve)
Manufacturer:	Bailey Control
Type:	Pneumatic Positioner Series 10
Model Number:	5321013-A1
Manufacturer Code:	B042
EIIS System Code:	SO
EIIS Component Code:	84
Root Cause Code:	X
Reportable to NPRDS:	No

3. Previous Similar Events:

One previous similar event in which an unplanned RPS actuation occurred in the Startup mode has been reported within the last 2 years. The event was reported in LER 50-321/1990-011, dated 6/22/90. Corrective actions for the previous event would not have prevented this event because the events involved different startup activities and each scram resulted in different RPS actuation signals.

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Georgia Power
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HL-1524
001336

March 15, 1991

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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PLANT HATCH - UNIT 2
NRC DOCKETS 50-366
OPERATING LICENSE NPF-5
LICENSEE EVENT REPORT
PERSONNEL ERROR RESULTS IN REACTOR
SCRAM ON APRM HIGH FLUX

Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(iv), Georgia Power Company is submitting the enclosed Licensee Event Report (LER) concerning personnel error which resulted in a reactor scram. This event occurred at Plant Hatch - Unit 2.

Sincerely,

J. T. Beckham, Jr.

JKB/cr

Enclosure: LER 50-366/1991-005

c: (See next page.)

Georgia Power

U.S. Nuclear Regulatory Commission
March 15, 1991
Page Two

c: Georgia Power Company
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Mr. J. D. Heidt, Manager Engineering and Licensing - Hatch
NORMS

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Mr. K. Jabbour, Licensing Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
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